lowest stages in the Mississippi were recorded on the 31st at Saint Louis, Missouri, and at stations southward; and between the 22d and 31st at stations north of Keokuk, Iowa. The observer at Saint Paul, Minnesota, states that, owing to the low stage of water in the upper Mississippi river during the month, it has been necessary that steamers should take barges in tow to serve as lighters.

The Missouri was highest at Yankton, Dakota, from the 1st to 4th; at Omaha, Nebraska, on the 2d; and at Leavenworth, Kansas, on the 20th. It was lowest at these stations from the 29th to 31st.

The Ohio river reached its highest stage from Cincinnati, Ohio, to Louisville, Kentucky, on the 4th and 5th; it was lowest at Cincinnati on the 20th, and at Louisville on the 27th.

Navigation in the Tennessee river at Chattanooga, Tennessee, except for small craft, was suspended on the 2d.

The highest and lowest stages of water observed at the Signal Service stations during August, 1883, are shown in the following table:

Heights of rivers above low-water mark, August, 1883.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.	
		Date.	Height.	Date.	Height.
Red River:	Ft. In.		Ft. In.		Ft. In.
Shreveport, La	29 9	1, 2, 17	8 10	10	5 9
Arkansas:					
Little Rock, Ark					
Fort Smith, Ark		11	4 9	3	*— 1 7
Missouri:					
Yankton, Dakota	20 0	1 to 4	3 6	29, 30, 31	2 1
Omaha, Nebr	16 0	2	9 5	31	7 4
Leavenworth, Kans	21 0	20	12 1	29, 30, 31	9 3
Mississippi:					
Saint Paul, Minn	14 6	1	3 6	26	1 8
La Crosse, Wis	18 0	1	4 10	31	1 11
Dubuque, Iowa	21 10	1	11 9	22	4 3
Davenport, Iowa	15 0	1	9 8	27	2 11
Keokuk, Iowa	14 6	3, 4	10 11	28, 29, 30	4 3
Saint Louis, Mo	30 0	3	21 3	31	11 4
Cairo, Ill	40 0	5	21 8	31	11 0
Memphis, Tenn	34 0	7, 8	16 1	31	8 6
Vicksburg, Miss	41 0	1	30 3	31	14 2
New Orleans, La†	—2 6	1, 2	— 3 9	31	—11 2
Ohio:					
Pittsburg, Pa	20 0	1	6 3	28	0 7
Cincinnati, Ohio	50 0	4	16 0	20	4 10
Louisville, Ky	24 0	5	7 11	27	4 0
Cumberland:					
Nashville, Tenn	42 0	3	10 1	31	1 9
Tennessee:					
Chattanooga, Tenn	33 0	19	2 7	13	1 2
Monongahela:					
Pittsburg, Pa	29 0	1	6 3	28	0 7
Savannah:					
Augusta, Ga	30 0	28	7 0	12	4 1
Willamette:					
Portland, Oreg		1	7 3	31	4 0
Sacramento:					
Red Bluff, Cal		1, 2, 3	0 7	4 to 31	0 6
Sacramento, Cal		1	7 9	31	6 9
Mobile:					
Mobile, Ala		1, 29	17 3	24	15 3
Colorado:					
Yuma, Arizona		6	19 9	31	16 8

* Below bench-mark. † Below high-water marks of 1874 and 1883.

HIGH TIDES.

Atlantic City, New Jersey.—Much damage was done at this place by the high tide of the 29th, which reached its highest point at 5.30 a. m. About two hundred and fifty places of business, including about twenty of the finest bathing houses, were washed away. The track of the Camden & Atlantic railroad, from this place to South Atlantic City, was covered with water, and it was reported that the meadows, three miles beyond the city, were totally inundated. Thousands of dollars worth of bathing suits were lost, and all kinds of business interests suffered serious loss. All of the railroad tracks between Atlantic City and Absecom, with the exception of the West Jersey railroad, were submerged and tracks injured. It is considered that $250,000 will not replace the property destroyed.

Seabright, New Jersey, 29th.—The high tide of this date caused a washout, of one-fourth mile in length, on the New Jersey Southern railroad, at Highland station, between this place and Sandy Hook. In some places the track was covered with more than two feet of sand, which caused serious interruption to travel. A large number of drowned cattle floated ashore between this and Highland station, which are supposed to have been washed or thrown overboard from ocean steamers.

Long Branch, New Jersey, 29th.—The beach at this place was badly washed by the high tide of this date. During the afternoon the water began running over the New Jersey railroad, opposite the highlands of Navesink. The track was undermined in several places, and at some points it was covered with nearly three feet of sand.

Newport, Rhode Island, 29th.—The heavy sea and high tide of this date washed away the platform leading from the road to the beach. The high sea prevented the steamers plying between this place and Block Island and Narragansett Pier from making their regular trips.

Ocean City, Maryland, 29th.—High tide flooding Atlantic and Wicomico avenues, and washing away a portion of the railroad bed near the station.

Boston, Massachusetts, 29th.—Very high tide and rough sea in the harbor on this date.

Block Island, Rhode Island, 12th; and unusually high on the 29th.

Portsmouth, North Carolina, 21st, 27th.

Wash Woods, North Carolina, 29th, 30th, 31st.

LOW TIDES.

Cedar Keys, Florida, 16th.

Indianola, Texas, 7th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for August, 1883, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 86.95 per cent. The percentages for the four elements are: weather, 87.63; direction of the wind, 81.74; temperature, 89.41; barometer, 87.89 per cent. By geographical districts they are: For New England, 88.04; middle Atlantic states, 91.08; south Atlantic states, 84.50; eastern Gulf, 86.49; western Gulf, 90.66; lower lakes, 88.31; upper lakes, 85.27; Ohio valley and Tennessee, 88.95; upper Mississippi valley, 83.94; Missouri valley, 81.42; north Pacific, 100.0; middle Pacific, 100.0; south Pacific, 97.91.

There were seventy-nine omissions to predict out of 3,813, or 2.07 per cent. Of the 3,734 predictions that have been made, sixty-seven, or 1.79 per cent., are considered to have entirely failed; ninety-five or 2.54 per cent. were one-fourth verified; four hundred and thirty-three or 11.60 per cent. were one-half verified; five hundred and thirty, or 14.20 per cent., were three-fourths verified; 2,609, or 69.87 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During August, 1883, one hundred and nineteen cautionary signals were displayed. Of these, eighty-nine, or 74.79 per cent., were justified by winds of twenty-five miles or more, per hour, at or within one hundred miles of the station. One cautionary off-shore signal was displayed, which was justified both as to direction and velocity. Seven cautionary signals were changed to northwest signals. One hundred and twenty signals, of all kinds, were displayed, of which ninety, or 75.0 per cent., were fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Nine signals were ordered late.

Eighty-six winds of twenty-five miles, or more, per hour were reported, for which no signals were ordered. Many of these were high local winds or strong sea-breezes.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at the Signal Service stations, during August, 1883, with the average depth at which the observations were made, are given in the table below. The highest water temperature recorded during the month, 92°.2, occurred at Ceder Keys, Florida; and

the lowest, 44°.3, occurred at Duluth, Minnesota. The largest monthly ranges of water temperature are: 24° at Provincetown, Massachusetts; 21°.8 at Duluth, Minnesota; 15°.8 at Milwaukee, Wisconsin, and 14°.3 at Cedar Keys, Florida. The smallest monthly ranges are: 1°.4 at Pensacola, Florida; 2°.2 at San Francisco, California; 2°.9 at Portland, Oregon, and 3°.5 at Grand Haven, Michigan.

Temperature of Water for August, 1883.

STATION.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.				
	°	°	°	ft.	in.	°
Atlantic City, New Jersey	69.4	61.4	8.0	5	2	70.5
Alpena, Michigan	68.7	62.7	6.0	12	1	61.7
Augusta, Georgia	90.0	80.0	10.0	5	0	76.9
Baltimore, Maryland	79.5	75.0	4.5	9	11	72.9
Block Island, Rhode Island	67.5	63.5	4.0	8	8	67.2
Boston, Massachusetts	65.7	59.4	6.3	21	4	67.6
Buffalo, New York	72.9	68.2	4.7	10	7	65.8
Cedar Keys, Florida	92.2	77.9	14.3	11	0	83.7
Charleston, South Carolina	86.1	80.1	6.0	40	8	79.9
Chicago, Illinois	70.7	64.2	6.5	8	5	68.3
Chincoteague, Virginia	82.5	71.0	11.5	5	6	72.3
Cleveland, Ohio	76.1	68.0	8.1	14	0	66.9
Detroit, Michigan	73.0	68.0	5.0	23	1	67.7
Delaware Breakwater, Delaware	75.0	66.8	8.2	9	8	71.7
Duluth, Minnesota	66.1	44.3	21.8	14	7	62.8
Eastport, Maine	50.7	46.3	4.4	15	8	62.2
Escanaba, Michigan	64.8	55.0	9.8	15	0	61.9
Fort Macon, North Carolina	85.0	71.5	13.5	8	1	77.4
Galveston, Texas	86.0	82.0	4.0	12	0	84.6
Grand Haven, Michigan	73.3	69.8	3.5	19	0	64.5
Indianola, Texas	91.5	85.5	6.0	7	11	83.6
Jacksonville, Florida	88.5	83.0	5.5	18	0	80.8
Key West, Florida	89.7	85.2	4.5	17	3	83.7
Mackinaw City, Michigan	66.8	61.0	5.8	12	0	62.0
Marquette, Michigan	60.0	54.0	6.0	9	10	61.9
Milwaukee, Wisconsin	69.9	54.1	15.8	8	0	65.9
Mobile, Alabama	89.6	84.0	5.5	16	5	82.0
New Haven, Connecticut	77.5	69.2	8.3	15	4	67.3
New London, Connecticut	70.0	66.0	4.0	12	7	67.9
New York City	73.1	68.6	4.5	17	0	70.8
Norfolk, Virginia	81.5	75.6	5.9	16	0	76.2
Pensacola, Florida	85.7	83.3	1.4	17	3	81.0
Portland, Maine	63.0	56.5	6.5	28	10	67.9
Portland, Oregon	65.3	62.4	2.9	57	2	62.7
Provincetown, Massachusetts	71.5	47.5	24.0	12	0	68.0
*Sandusky, Ohio	74.0	70.0	4.0	10	7	69.4
Sandy Hook, New Jersey	72.5	69.7	2.8	1	6	72.2
San Francisco, California	60.8	58.6	2.2	30	1	57.9
Savannah, Georgia	86.8	80.8	6.0	12	1	80.8
Smithville, North Carolina	86.2	78.0	8.2	10	0	78.1
Toledo, Ohio	75.7	71.7	4.0	11	11	69.2
Wilmington, North Carolina	85.5	80.0	5.5	20	1	78.2

* No observation from 1st to 5th, inclusive.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays were observed during the month as follows:

On the 1st, from New England westward to Dakota; on the 2d, in the upper lake region; on the 3d, at 9 p. m., at Morriston, Dakota; on the 5th, from New England westward to Minnesota; on the 6th, in Maine; on the 19th, at Wellsboro', Pennsylvania; on the 22d, in Maine and New Hampshire.

The most extended displays were those of the 1st, 5th, and 7th, of which the following reports have been received:

Eastport, Maine, 1st: an aurora was visible at this place from 9 p. m. until the early morning of the 2d.

Mount Washington, New Hampshire, 1st: an aurora was observed at this station at 10.15 p. m.; several distinct auroral beams appearing. The display was obscured by clouds at 11.40 p. m.

Marquette, Michigan, 1st: a faint aurora was seen here from 9 to 9.50 p. m.

Saint Paul, Minnesota, 1st: a pale auroral light was observed here from 10.40 to 11.35 p. m.

Eastport, Maine, 5th: faint aurora was visible from 11 p. m. until the early morning of the 6th.

Point Judith, Rhode Island, 5th: a faint aurora, of pale straw color, was observed at 9.35 p. m., which continued until the early morning of the 6th. The auroral light extended from the horizon to an altitude of 20°, and from nnw. to nne.

Gardiner, Maine, 8th: a bright aurora was visible during the evening.

Escanaba, Michigan, 5th: at 9 p. m. traces of an aurora were visible in the northwestern sky. Faint beams appeared for a few minutes, which were succeeded by a diffuse yellow light resting upon a dark base. The display ended at about 9.30 p. m.

Mackinaw City, Michigan, 5th: a poorly-defined auroral display was seen from 8.55 p. m. to 11 p. m.

Moorhead, Minnesota, 5th: a faint auroral display was visible here from 10 to 10.20 p. m.

Saint Vincent, Minnesota, 5th: a very faint auroral arch observed at 9.40 p. m.

Portland, Maine, 7th: pale auroral light from 8.30 to 10.30 p. m.

Ithaca, New York, 7th: faint aurora at 9 p. m.

Chincoteague, Virginia, 7th: an aurora was observed at this station from 8 to 9 p. m.

Woodstock, Maryland, 7th: an auroral light appeared suddenly at 8.35 p. m.; it consisted of numerous unsteady streamers, of reddish color, which had a rapid movement westward. By 8.45 p. m. the streamers had faded, leaving a diffuse light, which disappeared between 9 and 10 p. m.

Escanaba, Michigan, 7th: a faint auroral light, of greenish color, was seen in the north from 9.30 to 10 p. m.

Marquette, Michigan, 7th: faint aurora from 8.55 to 9.55 p. m.

Saint Vincent, Minnesota, 7th: a faint auroral arch was visible at 9.40 p. m.

The s.s. "Sardinian," on the 30th, in about N. 50°, W. 59°, reported a brilliant aurora visible in the northwestern sky.

THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:

New England.—1st, 2d, 3d, 5th, 7th, 10th, 11th, 13th, 18th to 24th, 26th.

Middle Atlantic states.—2d, 3d, 5th, 6th, 10th, 13th, 14th, 15th, 18th to 21st, 23d, 24th, 27th to 31st.

South Atlantic states.—1st to 8th, 10th, 11th, 13th to 18th, 20th to 29th.

Florida peninsula.—1st to 31st.

Eastern Gulf.—1st to 26th, 31st.

Western Gulf.—1st to 10th, 12th to 16th, 20th to 27th.

Tennessee.—1st, 2d, 7th to 11th, 13th, 14th, 15th, 20th to 26th, 28th, 29th.

Ohio valley.—9th, 10th, 12th, 13th, 15th, 19th, 20th, 22d, 23d, 24th, 28th.

Lower lakes.—1st, 2d, 3d, 9th, 10th, 12th, 17th to 20th, 22d, 23d, 28th, 29th.

Upper lakes.—1st, 2d, 11th, 17th to 22d, 27th, 28th, 30th.

Extreme northwest.—3d, 6th, 8th, 9th, 10th, 16th to 19th, 26th, 30th, 31st.

Upper Mississippi valley.—1st, 2d, 3d, 7th to 23d, 27th, 31st.

Missouri valley.—1st, 2d, 3d, 6th to 19th, 22d, 23d, 25th, 26th, 27th, 29th, 31st.

Northern slope.—1st to 14th, 17th, 25th, 28th to 31st.

Middle slope.—1st to 15th, 17th, 22d, 23d, 25th, 26th, 30th.

Southern slope.—1st, 2d, 6th, 9th to 13th, 20th to 24th, 26th.

Southern plateau.—1st to 12th, 14th to 21st, 23d to 29th.

Middle plateau.—1st to 5th, 9th, 10th, 11th, 16th, 25th, 28th to 31st.

Northern plateau.—4th, 5th, 24th, 25th.

Thunder-storms were also reported from the following stations not included in the districts named above: Fort Gaston, California, 31st; Oakwood, California, 28th; Poway, California, 14th; San Diego, California, 27th, 28th; Roseburg, Oregon, 1st; Portland, Oregon, 1st, 2d; Brownsville, Texas, 24th, 27th; Bainbridge Island, Washington Territory, 15th; Fort Townsend, Washington Territory, 3d.

ELECTRICAL PHENOMENA.

The observer on the summit of Pike's Peak, Colorado, reported that during a sleet and thunder-storm, on the evening of the 4th, the anemometer cups revolved in circles of electric light. After a flash of lightning the light encircling the cups